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# Econometric analysis of the hospitality industry using stock market data

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**ABSTRACT**

This paper describes the relationship of macroeconomic and non-economic indicators and the stock returns of the hospitality industry in Germany, France and Spain. For the study, information was collected on 4 macroeconomic and 7 non-economic variables, which included both predictable and non-predictable events from different spheres of human activity. Based on the data collected, the OLS and SUR analysis was conducted. The results showed that all countries and their hospitality industry are clearly dependent on non-economic indicators, such as political changes, the economic crisis, measures to eliminate it, mass events, as well as natural phenomena. These findings are consistent with previous empirical studies for other countries. After conducting regressive analyzes, it can also be affirmed that for countries that do not specialize in tourism as the main activity, these indicators do not have such a strong effect as for Spain, whose economy is based to a large extent on the tourism industry in recent decades.

## **1. INTRODUCTION**

Today tourism is a sphere of the socio-economic complex, which in many countries has turned into a booming industry. And the importance of tourism in the world is constantly increasing. The peculiarity of the modern stage of tourism development is the change in its organizational forms and the penetration into the tourist business of transport, commercial, industrial and other companies.

The tourist industry is beginning to significantly strengthen its position in the markets of the whole world, which affects the development of the country and regions, affecting the structure of the economy as a whole. Tourism allows to develop local infrastructure, create additional jobs, and have a stimulating effect on service industries. Therefore, we can talk about the effects of tourism on the economy of a country (region), both direct and indirect.

In many countries, the high competitiveness of the tourism industry due to the fact that it is simultaneously: consumer services (goods) and work rendered by various industries, economy (transport, food industry, hotel business, etc.), the largest employer, multiplier for the development of other groups of goods and services, tax payer to the state budget of various levels.

The share of tourism in global GDP is 11,7%, created around 260 million jobs (12% of the total employment market in the world) according to the International Labor Organization. The contribution of tourism reached 137 million euros in 2017, representing 11.7% of GDP of Spain. In case of Germany the contribution is 8,7% of GDP in 2017 that is 348 million euros. For France tourism represents 9,4% of GDP in 2017 that is equal to 204 million euros. The prospects for the development of this sector of the economy are very large. Every year the number of those who wish to visit different regions of the planet increases. This business is highly profitable industry. That is why many countries are interested in the development of this field of activity. The practice of a number of countries has proved that this service complex can be profitable even with a relatively weak economy: Egypt, Mexico, Tunisia attract guests from all over the world due to the developed infrastructure, service, exotic travels and affordable prices. For example, after the war, Croatia began, first of all, to restore the "entertainment industry". In a short time, the best hotels were repaired, prepared to receive tourists. Hundreds of millions of dollars left by guests have become the locomotive for the entire economy of the country.

This economic sector's efficient growth due to the fact that the tourism industry acts as an autonomous, comparatively distinct connection between the economic system in developed countries, attracting vital material, financial and labor resources.

The tourism industry is beneficial not only for the country as a whole, but also attractive for small and medium enterprises, not to mention big business, for the following reasons: small start-up investments, growing demand for these services, high level of profitability, minimum payback period.

Europe is the world's leading tourist destination with 580 million international tourists in 2016. According to the UNWTO's projections, in 2030 there will be 1.8 billion international tourist arrivals in the world, a figure that in Europe will be about 750 million, more than 40% of the total. Such a place is provided by the availability of tourist resources, including diversity of landforms and climate, cultural and historical landmarks, also this is due to the territorial proximity of the EU countries, with local solution of information problems, free movement through the border, multiethnic culture, widespread advertising and a developed tourist infrastructure.

Many national and international researchers write research papers and articles on tourism industry growth under the impact of multiple variables. Researchers focus on methodologies for developing and implementing state and regional tourism strategies, identifying the financial and institutional levers of tourism development regulatory policy, The preconditions for the creation and values of the functioning of recreational and tourist businesses, the classification of their forms and kinds, the planning of tourist enterprises ' financial and economic operations, the forecasting of the growth of the national tourist services industry, the economic of evaluation mechanism and the tourist attractiveness regulation of the territory.

Research conducted on written works on the growth of the tourism industry contributes to the conclusion that the issue of the impact of different variables on the growth of tourism and all its sectors is not yet adequately researched and that further research is necessary.

Thus, the existence of favourable variables contributes to the management in world tourism of individual areas and nations, and undesirable variables decrease tourist flow.

The main factors influencing the development of tourism are divided into two groups. First, static, with a steady time value. This group mainly encompasses the territory's recreational and resource capacity reflected in the amount and quality of

natural, cultural and historical assets. Second, dynamic-political, socio-demographic, economic, financial and material. Also, the shift in a person's life's stereotype from static to dynamic is common.

In turn, the hospitality industry constitutes a large part of the functioning of all tourism. From an economic point of perspective, the hospitality industry is a unique type of tourist consumption of material products, services and products, assigned to a distinct sector of the economy, supplying tourists with everything they need: cars, food, lodging, cultural and daily facilities, entertainment. The hospitality industry is therefore (in some countries) one of the most promising sectors of the national economy.

The hospitality service includes such industries that are focused on the provision of housing, the sale of alcoholic beverages, the provision of food and entertainment.

Being hospitable means being able to give your visitors a warm welcome, creating a calm, favorable and friendly atmosphere for them. The hotel service includes a whole range of services for tourists in the field of inbound and domestic tourism and is a key factor in determining the prospects for tourism development.

Tourist services are classified as social and cultural services, including within the framework of hotel services. They are based on modern hospitality principles that enhance their role in domestic tourism development and also set certain tasks in the tourism and hotel services training system.

And although many factors have already been studied many times by other researchers, this work will focus on the influence of economic and non-economic factors on the market situation of organizations belonging to the hospitality industry such as hotels. Various statistical data for the period from 2000 to 2018 will be used for this, as well as stock market data of hotels companies for this period.

Therefore, the main purpose of this work consists of two points:

1 – Consideration of a general understanding and justification of the relationship between economic returns and potential influential factors (macroeconomic and non-economic) on the hospitality market.

2- Using the econometric model, formally evaluate the strength of these impacts in different countries to give empirical evidence to determine country that is the most affected one by these factors.

In case of economic indicators, scientists and organizations have already achieved great success in terms of their forecasting and studying their impact on the organization's activities. But in case of non-economic factors, such as terrorist attacks, natural disasters,

games or contests, the appearance and influence of which are poorly predictable, there is still little data and research on their manifestations and the possibility of an organization's response to their consequences.

## **2. LITERATURE REVIEW**

One of the widely accepted concepts of Western economic thought, which is still taught in many universities of the world and has its adherents - the effective market hypothesis, which assumes that all information relating to a traded asset (in this case, a stock) immediately becomes known to participants in market transactions and is instantly reflected in prices. On this basis, market efficiency is understood to mean information efficiency, that is, how quickly and fully the incoming information about the circulating assets is reflected in their prices. L. Kuznetsova notes that according to this theory there is no fundamental work on this topic. It is represented only by journal publications, of which the first were published articles by Roberts (1959) and Fama (1965).

However, in his dissertation, *The Theory of Speculation*, published in Paris in 1900, French economist Louis de Bachelier made the very first theoretical assumptions, which later formed the basis for an efficient market hypothesis, at the beginning of the 20th century. Bachelier outlined considerations regarding random fluctuations securities on the stock exchange. After half a century, many economists addressed this topic.

The final formulation of the effective market hypothesis was given by the American scientist Fama in 1965. According to Fama, market efficiency is the ability to quickly adapt to new information. Rapid adaptation to new information is an important characteristic of market efficiency, but does not define it exhaustively. This definition implies that rationality is inherent in the process of disseminating market information, current news is not ignored, and systematic errors in analysis and forecasting are not allowed. As a result, stock prices always correspond to the fundamental factors underlying pricing.

The efficient market hypothesis includes the following assumptions. First, the prices of financial assets vary over time in accordance with the law of random walk. In an efficient market, systematic trading leads to zero returns in the long run. Second, new information is quickly reflected in the prices of financial assets, the current available information does not allow to predict future price changes and to extract from this income. Third, technical analysis does not give the trader any useful information. The hypothesis of an effective market excludes the possibility of obtaining future income based on knowledge of past price movements. Fourth, managers of investment funds can not systematically achieve greater returns than the average for the market, because they can not foresee the news. Fifth, the prices of financial assets always correspond to the

fundamental pricing factors. And finally, there are three forms of market efficiency: weak (the price of an asset fully reflects only past information), average (price reflects not only past, but public information becoming publicly available at the present time) and strong (insider information is also included in the price).

From 1890 to 1902, Charles Dow, the first editor of The Wall Street Journal and the author of the most well-known stock exchange index, wrote a series of articles that later turned into a “Dow theory” and gave birth to technical analysis. The basic tenets of the theory: price includes everything, prices follow trends, the market has a memory.

According to Dow's theory, the started trend has more chances to continue than to change, and price behavior is described by certain tendencies, that is, by directed movements up or down, which reflect the prevailing opinion on the future of an economy or an individual company, in other words, the “mood” of the participants. These attitudes affect the perception of any company information by all market participants. For example: “Bad reporting is a temporary phenomenon; an enterprise produces unique products that will be in high demand.” However, in the case of negative sentiment, the very first poor reporting could be classified as a signal of incorrect forecasts regarding the future of high demand.

Given the growth of tourism, many investors may consider investing in the largest of its industries profitable enterprises, but the stock valuation due to the instability of the stock market's financial condition is quite high. In taking the first step to improve investment safety measures, the need for inventory valuation is articulated. By investing the means at his disposal in a company's shares, the investor thus contributes to its business development, the shareholder becomes the company's co-owner.

The company's market value is also mainly determined by the share price. Fundamental market assessment and the state of an enterprise's economic position enables possible errors in the volatility circumstances of securities prices to be avoided. Share valuation improves trust in the choices taken, provides sound proof to boost investment, as autonomous evaluators determine the market value of securities in accordance with federal law valuation operations.

Indicators that contribute to changes in stock markets can be divided, as we have already said, on economic and non-economic ones. In many industries, their influence has been repeatedly stated in scientific articles. The study of economic drivers involved such scientists as Firth (1980), Chen (1986), Fama (1988), Wasserfalten (1989), Levine and Zervos(1998), Flannery and Protopapadakis (2002), Boyd et al. (2005), Cherif and



Gazdar (2010), Benaković and Posedel(2010), Butt, Rehman, Khan and Safwan (2010), Ho and Odhiambo(2017) among many others. Non-economic indicators have also been often studied in articles by scientists such as Beaulieu (2005), Leblang and Mukherjee (2005), Edmans et al. (2007), Biakowski et al. (2008), Kaplanski and Levy (2010), Chesney et al. (2011), among others.

But for each industry, indicators can vary as well as their effects. As for the hospitality industry, there are not many articles and studies on this topic. Most of the studies that analyze the influence of factors on the stock market situation and the stock prices of a company belong to the Asian market and are carried out by such scientists as Wong and Song (2006), Chen et al. (2012). Their works tell us about the effects on the stock returns of Japanese hospitality industry through vector autoregressive model caused by macroeconomic factors. Also Chen et al. (2007) investigate the reaction to the SARS disease that was analyzed by using data of the stock returns of hospitality industry in Taiwan. Following that study, Chen (2007) applies the similar methodology to analyze the influence of macroeconomic and non-macroeconomic factors on Chinese hotel stock returns. Another study by Chiang and Kee (2009) investigates the effects on the hotel stock returns in Singapore.

But there are also studies about the United States, as well as Europe. Nicolau (2009) analyzes three types of environmental events and their effects on the stock returns of a Spanish hotel chain. Cirer-Costa (2017) look at the impacts of Brexit on the tourism stock returns. Barrows and Naka (1994) are one of the first authors to study the dependence of stock returns of the hospitality industry on the macroeconomic variables in the US. Wong and Song (2006) use the vector autoregressive model for investigating the predictability of hotel stock returns in the US using macroeconomic variables. Zopiatis et al. (2018) explore the impacts of 150 non-macroeconomic on the world's five tourism and hotel stock indices. They discover that incidents of terrorism and natural disasters considerably affect indices of tourism and hotel stock. Hyde (2007) explored the sensitivity of stock returns in UK, France, Germany and Italy from multiple sectors. The author demonstrates that only the stock returns of the German hospitality industry were substantially affected by exchange-rate shocks, whereas interest-rate shocks only had a substantial effect on the French hospitality industry's stock returns.

All these works will help conduct a more detailed study of the proposed topic, emphasize the knowledge already acquired by other researchers and develop a more effective analysis model.

As a result of the study, hope to identify links among all financial, economic and non-economic indicators and their influence on the market position of hotels in selected European countries.

### 3. METHODOLOGY

The first step in determining the methodology is the process of selecting economic indicators that will be used in the study. After the survey, it was decided that following indicators will be used as economic factors: unemployment rate, short-term interest rate, currency exchange rate and as a tourism level indicator international tourist arrivals. Of course, there are multiple other macroeconomic variables that can be added, but taking into consideration other studies, exactly these variables are huge determinants of the behaviour of the hotel stock returns. In particular, the impact of macroeconomic factors on stock returns has a strong financial basis, see among many others Firth (1980), Wasserfallen (1989).

International tourist arrivals are a significant measure of tourism activity and this indicator has a powerful impact on hotel and other sector performance. The growth of the country's tourism sector can be evaluated using this indicator (Kim et al., 2006) and the rise in global tourist arrivals is obviously strongly linked to the amount of visitors using the hospitality industry. The growth of international tourist arrivals in this sense will have a positive effect on hotel stock performance. The growth rate of international arrivals is calculated after Chen's (2007) work as the natural log of the difference between the current month and the previous month

$$\Delta ITA_{t,C} = (\ln ITA_{t,C} - \ln ITA_{t-1,C}) * 100 \quad (1)$$

where  $t$  is time period of the data and  $C$  is country.

In addition, a change in the average monthly exchange rate may affect international travel expenses in the country of destination. For example, when the USA dollar becomes more expensive, tourists from there can spend more money in Europe. On the contrary, if the euro rises, tourists from America will leave less money in Spain because of their budgets that is limited. The same logic applies in the opposite direction. Thus, an increase in the exchange rate may adversely affect the number of tourists and the amount of their spending in the country, which will inevitably affect the income of hotels and other companies which in turn will lead to changes in stocks and prices.

The changes of average monthly currency exchange rate are defined as in work of Chiang and Kee (2009) as

$$\Delta EXR_{t,c} = (\ln EXR_{t,c} - \ln EXR_{t-1,c}) * 100 \quad (2)$$

Meanwhile, if the previously mentioned 2 macroeconomic indicators are more relevant to tourism, the interest rate is considered a vital factor in determining the stock market as a whole. In his work, Chen et al. (2005) says investors have less incentive to invest in stocks when interest rates are high because of the better long-term investment option. The use of interest rates in explaining the behavior of stock returns is widely documented, see for example Bulmash and Trivoli (1991) and Abdullah and Hayworth (1993). Change of short-term interest rate is defined as

$$\Delta STIR_{t,c} = STIR_{t,c} - STIR_{t-1,c} \quad (3)$$

The unemployment rate is an indicative variable that can tell investors about the general state of the economy in the country and its sustainability. High unemployment adds uncertainty to a country's economy, which can increase risk in the stock market. In this case, the increase in unemployment may adversely affect the profitability of hotel shares. In line with the paper of Chen et al. (2005), the changes in the unemployment rate are calculated using the normal difference of previous value

$$\Delta UNMP_{t,c} = UNMP_{t,c} - UNMP_{t-1,c} \quad (4)$$

Unemployment rate is one of multiple measures used to evaluate the real economic activity of the country and Wasserfallen (1989) found that stock returns are positively related to real economic activity. We choose the unemployment rate due to the availability of the data at a monthly frequency.

After determining the necessary macroeconomic indicators, an analysis was conducted of hotel companies to identify hotels in different countries that will be used in the study. The main prerequisite for the search was the availability of data from the Thomson Reuters Database on prices for the period from January 2000 to December 2018. Thus, the following companies were selected: TUI DE and IFA Hotel & Touristik AG for Germany, Accor hotels, Hôtel Majestic Cannes and Pierre & Vacances for France, Melia Hotels International and NH Hotel Group for Spain. All these companies are

represented on the public stock market and have information required for calculating indicators. Table 1 contains the detailed information about those selected hotels.

In addition, each company's recorded amount of hotels can offer us a general idea of the size of their hotel business. In addition, market capitalization shows each enterprise's capital scale and these numbers are used to calculate stock price indices.

Table 1. Selected hotels for Spain, Germany and France

Company	Headquarter	Number of hotels	Capitalisation, million euro
Accor hotels	France	1583	9410
Hôtel Majestic Cannes	France	1	258,42
Pierre & Vacances	France	186	156
Melia Hotels International	Spain	89	1910
NH Hotel Group	Spain	133	1770
IFA Hotel & Touristik AG	Germany	22	356,4
TUI	Germany	380	4920

Source: own elaboration

The method suggested by Chen (2007) is used to calculate the hotel price index with monthly hotel inventory rates of chosen hotels from January 2000 to December 2018 using the value-weighted principle to obtain the hotel results of each nation. At time  $t$  for a country  $C$  the hospitality price index is given by:

$$HPI_{t,C} = \sum_{i=1}^n P_{it} * w_i \quad (5)$$

where  $n$  is the number of the country's hotel stocks,  $P$  it is the monthly hotel I stock prices and  $w$  I is the weights of the hotel stocks calculated on the basis of capitalization.

Then, the dependent variable, which is the hotel stock returns (HR) at time  $t$  are calculated as a difference of the natural log of the hotel price index defined in (5):

$$\Delta HR_{t,C} = (\ln HR_{t,C} - \ln HR_{t-1,C}) * 100 \quad (6)$$

After determining the economic and financial variables, it is also necessary to identify a list of non-economic variables. The following events were chosen as non-economic:

- Terrorist attack on twin towers and the Pentagon in the USA (September 2001) (TA1109)
- Plane crash that claimed the lives of more than 50 children in Germany ( July 2002)(PC2002)
- Global stock market collapse (October 2008) (GSMC)
- London G20 (April 2009) (LG20)
- Egypt military coup (July 2013)(EMC)
- Terrorist attack in Paris (November 2015) (PTA)
- Brexit referendum (June 2016) (BRX)
- Labor reform in France (July 2016) (LRF)
- Olympic games in Russia (June 2018) (OGR)

Selected events occurred during the last 15 years and had a significant impact on various areas of activity. Each of them refers to different types of events: political, sports, economic or natural disasters. In the context of the data for analysis, these events will be used as dummy variables in the months of the events.

The most commonly used technique of statistics in the social sciences is the regression analysis. Regression is used to assess the connection between two or more object characteristics. Defining and measuring links enables you to better interpret what is happening on the spot, predict where something is going to occur, or start checking why situations are taking place.

OLS is the most well-known regression analysis method. The technique offers a global model of a variable or process that you would like to study or predict ; it produces an equation of regression that reflects the progressing process.

It is the OLS that will be used for the initial analysis of the relationship between economic and non-economic indicators and the dependent variable. This method will be used to evaluate each country separately.

After analyzing each country separately, it is necessary to use a multiple linear regression model to analyze the three countries. Despite the fact that Chen used the two-step regression approach that selects significant macro variables and then includes the non-economic variables. This work will use the Seemingly Unrelated Regression (SUR) method, firstly proposed by Zellner (1962). It was decided to use the SUR model, which is a system of independent equations in which the condition on the independence of random errors of different equations from each other was

violated. For example, correlation between errors of different equations in the same observations is possible. The SUR model for all countries can be defined as :

$$\begin{bmatrix} HR\_D \\ HR\_F \\ HR\_S \end{bmatrix} = \begin{bmatrix} \chi_D & 0 & 0 \\ 0 & \chi_F & 0 \\ 0 & 0 & \chi_S \end{bmatrix} \begin{bmatrix} \beta_D \\ \beta_F \\ \beta_S \end{bmatrix} + \begin{bmatrix} \varepsilon_D \\ \varepsilon_F \\ \varepsilon_S \end{bmatrix} = \chi\beta + \varepsilon \quad (7)$$

Where is  $\chi$  a  $3T \times 3K$  regressor matrix,  $\beta$  is a  $3k \times 1$  parameter vector and  $\varepsilon$  is a  $3K \times 1$  random disturbance term.

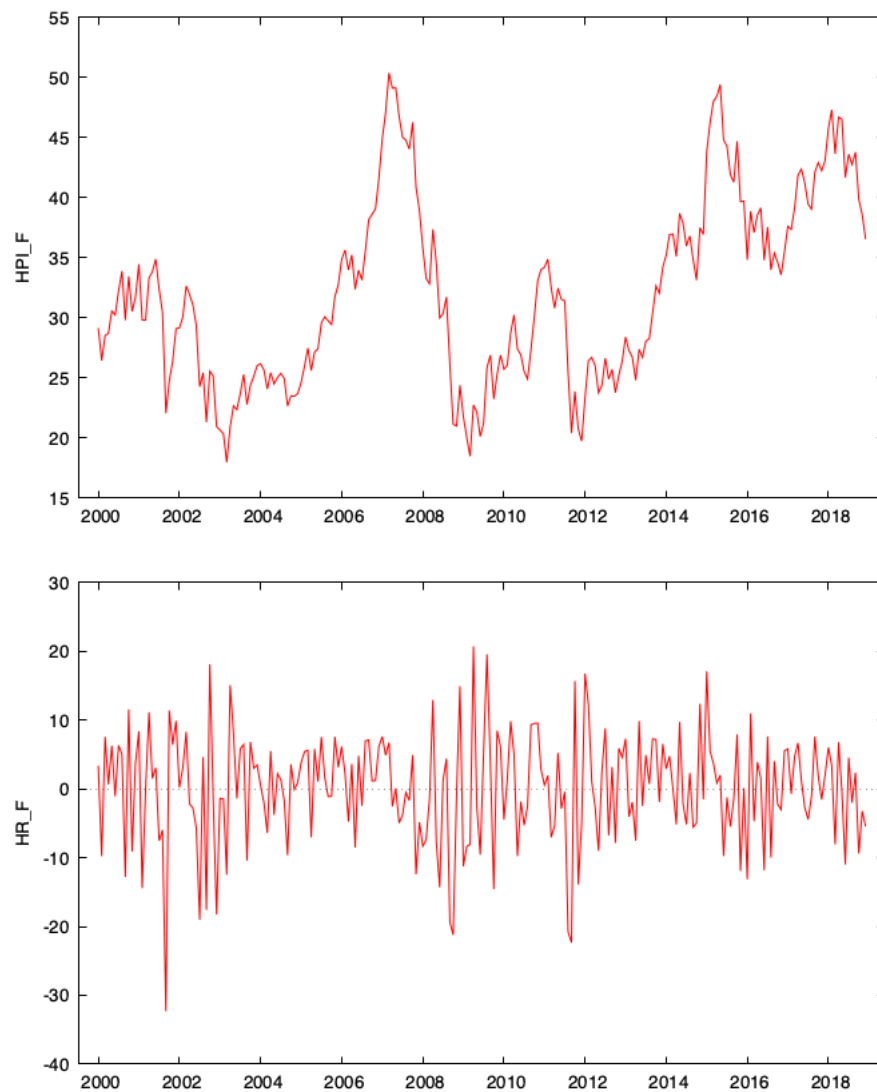
Following the determination of factors and the selection of models for evaluation, findings on the effect of financial and non-economic factors on hospitality industry shares can start to be achieved.

#### 4. RESULTS

In this study, the GRET software, an application software package for econometric modeling, part of the GNU project, was used to analyze the data.

The hotel stock returns for each country include 228 monthly observations. Figure 1-3 plots the time series for the hotel price index and hotel stock returns for each country.

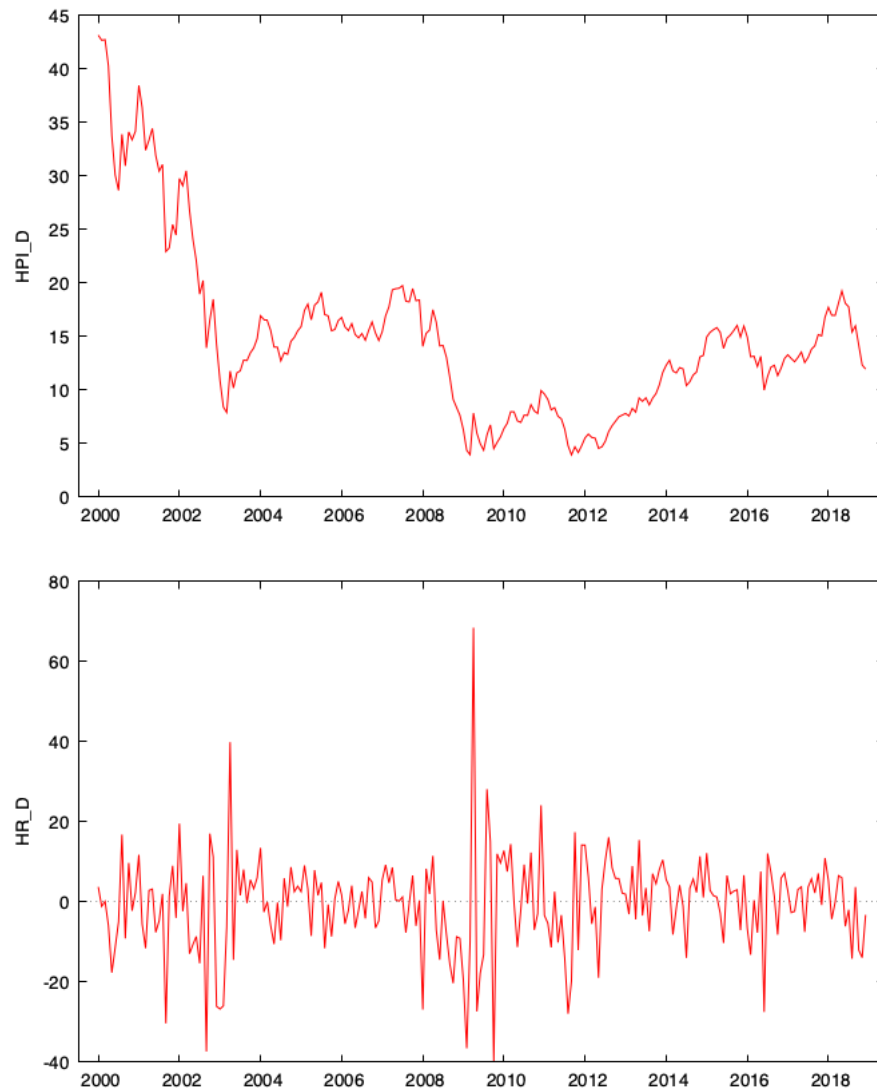
Figure 1. Time series plot HR and HPI France



Source: own elaboration from GRET



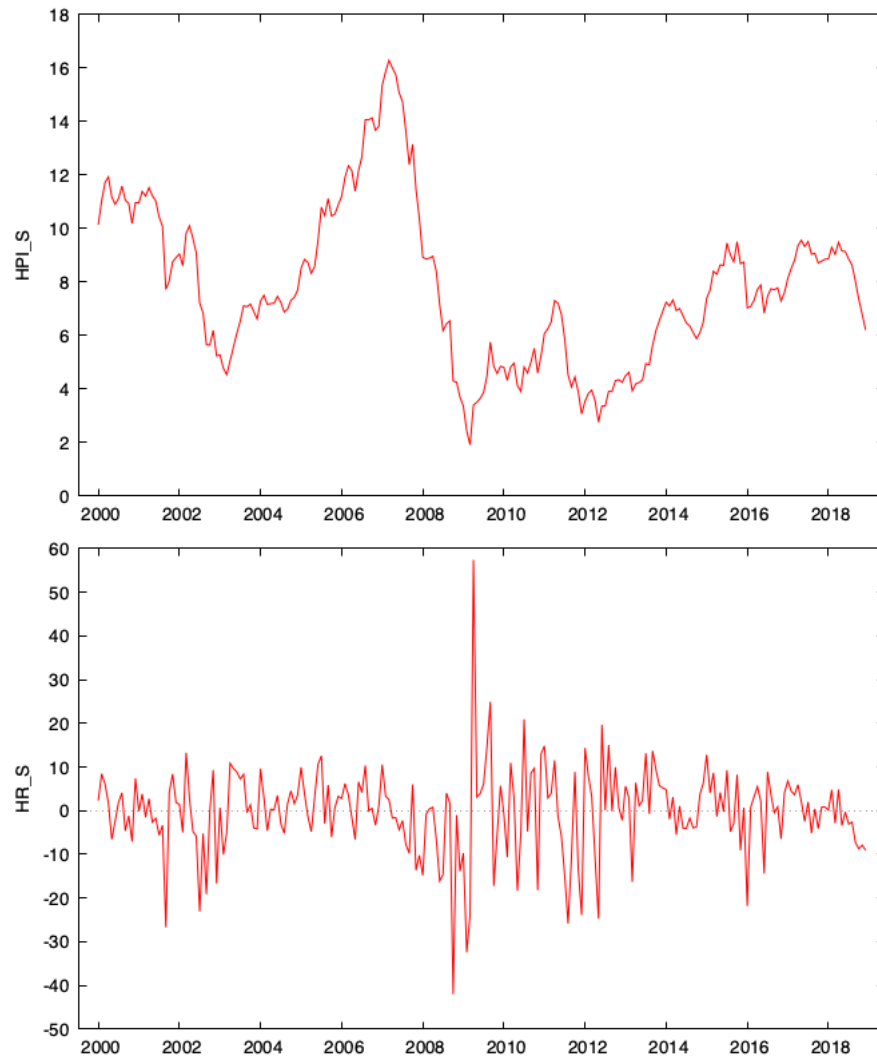
Figure 2. Time series plot HR and HPI Germany



Source: own elaboration from GRET

From the data obtained in plots in Figures 1-3, it can be concluded that at the beginning of the 21st century in all countries there was a decline in the selected indicators, which can be explained by the creation and introduction of a single European currency in 1999 and its introduction into circulation in 2002. After this period, an increase has been observed since 2003 until 2008, when there was an economic crisis. After this period, there is a recovery period in each country with different periods of recession for various reasons. But the general trend speaks of growth.

Figure 3. Time series plot HR and HPI Spain



Source: own elaboration from GRET

Before building regression models, all variables were tested for stationarity using the ADF test in GRET. The stationarity of the time series is the mathematical expectation (average), the dispersion and autocovariance (in different intervals) of which do not depend on time. If it is stationary, then it can be modeled in different ways, in particular with the help of two components - autoregressive (AR) and moving average (MA).

All macroeconomic variables for all countries (not shown here) were tested, which showed that all variables in the study are stationary.

After that, the main descriptive statistics for all variables and countries was obtained. The results are presented in Table 2. From this data Sharpe ratio is a frequently used benchmark that has been calculated to describe how well an investment utilizes risk to obtain return. The Sharpe Ratio can be used to rapidly decide which one is a better use of your funds, given several investment decisions. It is equivalent to an investment's efficient return separated by its standard deviation (the latter being a way of measuring risk). For France, Germany and Spain it is 0,010, -0,045 and -0,02 respectively with assumption that risk-free interest rate is 0%. According to the results obtained, it can be said that investing in the shares of French hotels is a more rational solution than in hotels of other countries. But these results should be treated with caution, since this calculation is very simplified and does not include many indicators.

If we consider macroeconomic variables, we can say the following. According to the mean value of the indicator SIR, which is negative for each country, it can be argued that over the past 20 years, on average, the European Union has reduced its interest rates. It is clear from the mean of unemployment rate that in Germany and France the unemployment rate has decreased, but the level in Spain has increased. For all countries, the indicator TA mean is positive, indicating an increase in tourist activity in each of the countries. And the exchange rate indicator mean shows that the euro prevails over the dollar in value.

Table 2. The main descriptive statistics

Variable	Mean	Median	S.D.	Min	Max
UNMP_F	-0,01	0,00	0,11	-0,76	0,30
SIR_F	-0,02	0,00	0,15	-0,95	0,44
EXR_F	0,05	0,02	2,35	-7,02	7,01
TA_F	0,63	6,54	42,50	-118,50	115,60
HPI_F	32,07	31,25	7,68	17,98	50,38
HR_F	0,11	0,89	8,04	-32,30	20,71
UNMP_D	-0,02	0,00	0,11	-0,50	0,70
SIR_D	-0,02	0,00	0,15	-0,95	0,44
EXR_D	0,05	0,02	2,35	-7,02	7,01
TA_D	0,58	3,67	16,79	-33,94	32,90
HPI_D	14,91	13,97	8,00	3,95	43,20
HR_D	-0,55	0,97	12,00	-39,90	68,40
UNMP_S	0,01	0,00	0,25	-0,40	1,10
SIR_S	-0,02	0,00	0,15	-0,95	0,44
EXR_S	0,05	0,02	2,35	-7,02	7,01
TA_S	0,39	4,46	23,24	-61,50	34,10
HPI_S	7,84	7,42	2,98	1,92	16,28
HR_S	-0,21	0,69	9,99	-42,00	57,40

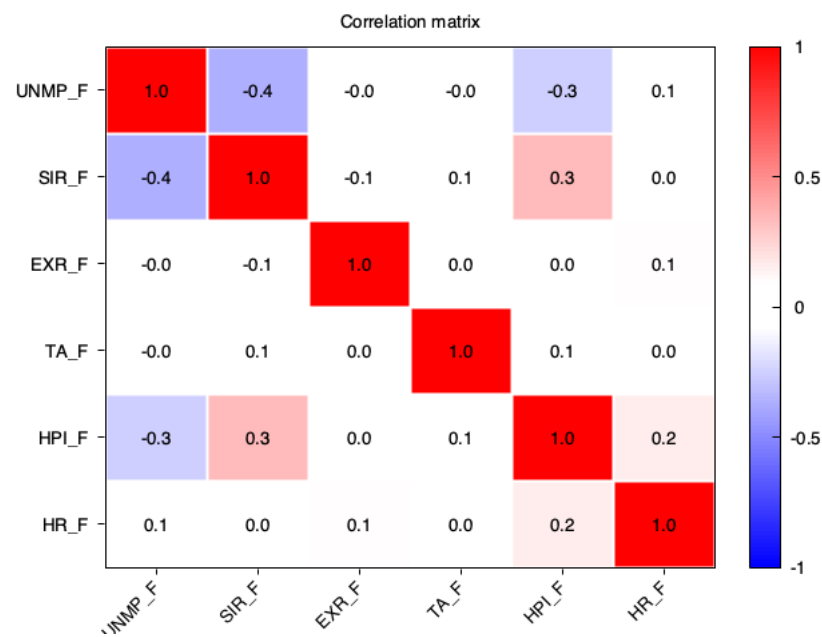
Source: own elaboration from GRET

Before conducting a regression analysis, it was also necessary to study the correlation between the variables and, if necessary, eliminate some variables. Figures 4-6 show correlation matrices for each of the countries. Its essence lies in the fact that when the value of one variable changes, a regular change (decrease or increase) occurs in the other (s) variable (s).

Try to determine if there is a statistically significant connection between two or more factors in one or more samples when calculating correlations. It is essential to realize that the reliance on correlation only reflects the connection between the factors and does not talk of interactions between cause and effect.

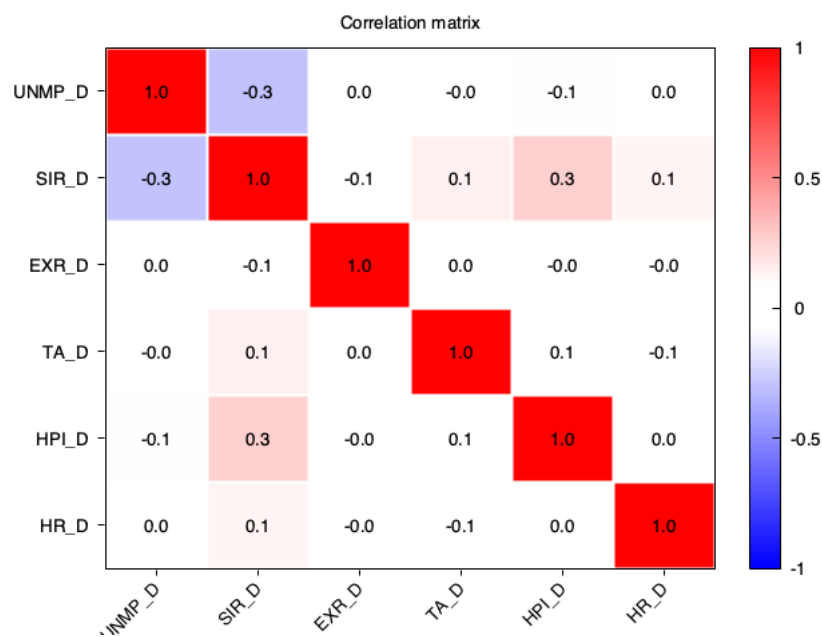
The coefficient of correlation ( $r$ ) characterizes the value that reflects the degree of interrelation between two variables. It may differ between -1 (negative correlation) and +1 (positive correlation). If the coefficient of correlation is 0, this shows that the variables are not correlated. And if the coefficient of correlation is nearer to 1 (or -1), then a powerful correlation is said, and if it is nearer to 0, then a weak correlation is said.

Figure 4. Correlation matrix France



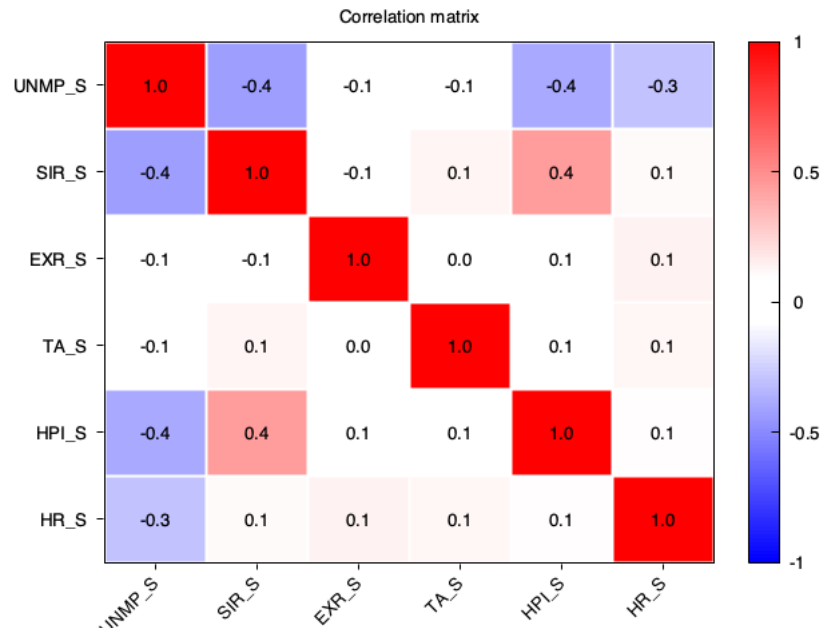
Source: own elaboration from GRET

Figure 5. Correlation matrix Germany



Source: own elaboration from GRET

Figure 6. Correlation matrix Spain



Source: own elaboration from GRETL

From these matrices it is clear that among the variables there are no those that are strongly correlated with each other. This means that we do not need to exclude any of the variables to avoid the problem of multicollinearity when conducting regression analysis. From the matrix for Spain, it can be seen that the HR is positively correlated with SIR, EXR and TA, but negatively correlated with UNMP. According to the matrix of correlations of variables for Germany, it is clear that the indicator positively correlates with the indicator of the paint-level interest. Also according to the data there is a negative correlation with the number of tourists. And zero correlation with other variables. According to the French correlation matrix, there is a positive correlation with the unemployment rate and the exchange rate. All other correlations are zero.

Next step is to estimate the regression model in (7) with restricted covariance matrix such that  $\sigma = 0$  using OLS. In this multiple linear regression model, using four macroeconomic and seven non-economic explanatory variables we regress hotel stock returns as dependent variable.

Standard linear regression models suppose that there is no correlation between errors in the dependent variable and independent variables. If this is not the case (for example, the bidirectional variable relationship), linear regression using ordinary least squares (OLS) will no longer provide optimal estimates of the model. The two-stage regression of the least squares uses instrumental variables that do not correlate with error terms to calculate estimated values for issue predictors (first phase) and then use these calculated

values to assess the dependent variable's linear regression model (second phase). The results of the regression are presented below in Tables 3-5.

Table 3. OLS France

Dependent variable: HR\_F

	Coefficient	Std. Error	t-ratio	p-value	
const	0,471667	0,508386	0,9278	0,3546	
UNMP_F	6,06822	4,90171	1,238	0,2171	
SIR_F	3,33857	3,71293	0,8992	0,3696	
EXR_F	0,28224	0,216387	1,304	0,1935	
TA_F	−0,00361622	0,0120007	−0,3013	0,7635	
EMC	5,38696	7,47943	0,7202	0,4722	
GSMC	−21,0270	7,76584	−2,708	0,0073	***
LG20	19,5776	7,53496	2,598	0,01	**
PTA	7,34393	7,47103	0,983	0,3267	
BRX	−12,0528	7,45635	−1,616	0,1075	
OGR	−11,0813	7,46045	−1,485	0,1389	
TA1109	−32,0878	7,58472	−4,231	<0,0001	***
PC2002	−20,3938	7,50589	−2,717	0,0071	***
LRF	1,27644	7,46818	0,1709	0,8644	
Mean dependent var	0,113776		S,D, dependent var	8,042053	
Sum squared resid	11828,81		S,E, of regression	7,434705	
R-squared	0,194285		Adjusted R-squared	0,145340	
F(13, 214)	3,969429		P-value(F)	8,30e-06	
Log-likelihood	−773,6981		Akaike criterion	1575,396	
Schwarz criterion	1623,407		Hannan-Quinn	1594,767	
rho	−0,068469		Durbin-Watson	2,132809	

Source: own elaboration from GRET

According to the results of OLS in France, it can be seen that macroeconomic indicators, such as unemployment rate, exchange rate, short-term interest rate, have a positive effect on the hotel stocks return. And only the number of tourists arrivals has a slightly negative effect. But none of these variables has significant effect either at level 1%, 5% or 10%. Regarding non-economic variables, terrorist attack in 2001, plane crash in 2002, the Global stock market collision that occurred in October 2008, as the Brexit referendum in June 2016 and including Olympic games in Russia in June 2018, all of these events are for the indicator hotel stocks return negative effect. And the events of

the London G20 summit, which took place in April 2009, the Egypt militar coup in July 2013 and the labor reform in 2016 have a positive effect on our dependent variable. Although only terrorist attack in New York, awful plane crash in Germany, the Global stock market collision and the London G20 summit out of all noneconomic variables are statistically significant at 1% and 5% respectably. These results can be explained by the fact that the Global stock market collision and the London G20 summit, the events that most affected the financial markets and the overall economic situation of the countries of the world and had one of the greatest impact on the dependent variable. In case of terrorist attacks and plane crashes of great importance is the human factor, namely fear and a sense of self-preservation. After such loud and terrible events, people prefer to stay at home, where they feel most secure. And trips to other countries are postponed until better times. At such moments, all industries are in some decline, especially in the service sector.

Table 4. OLS Germany, Dependent variable: HR\_D

	<b>Coefficient</b>	<b>Std, Error</b>	<b>t-ratio</b>	<b>p-value</b>	
const	-0,1212	0,7527	-0,1610	0,8722	
UNMP_D	5,3736	7,1409	0,7525	0,4526	
SIR_D	13,7051	5,2005	2,6350	0,0090	***
EXR_D	-0,1988	0,3109	-0,6396	0,5231	
TA_D	-0,0886	0,0436	-2,0320	0,0434	**
EMC	5,9505	10,7940	0,5513	0,5820	
GSMC	-24,0050	10,9679	-2,1890	0,0297	**
LG20	71,9866	10,8676	6,6240	<0,0001	***
PTA	2,6449	10,7206	0,2467	0,8054	
BRX	-26,8679	10,7185	-2,5070	0,0129	**
OGR	-5,4991	10,7289	-0,5126	0,6088	
TA1109	-27,0399	10,8815	-2,4850	0,0137	**
PC2002	-11,0921	10,8561	-1,0220	0,3081	
LRF	9,0890	10,7331	0,8468	0,3980	
Mean dependent var	-0,546421		S,D, dependent var	12,00970	
Sum squared resid	24448,23		S,E, of regression	10,68850	
R-squared	0,253281		Adjusted R-squared	0,207919	
F(13, 214)	5,583612		P-value(F)	9,76e-09	
Log-likelihood	-856,4643		Akaike criterion	1740,929	
Schwarz criterion	1788,939		Hannan-Quinn	1760,299	
rho	0,062963		Durbin-Watson	1,872746	

Source: own elaboration from GRET



According to the results of the regressive analysis of German data, slightly different results were found. In turn, from economic indicators unemployment rate and short-term interest rate have a positive effect on the variable, and the exchange rate and the number of tourists are negative. The result on the level of the exchange rate can be explained by the fact that when the euro strengthens as a currency, the level of purchasing power of visitors from other countries falls, which also applies to the price level of shares. In the case of a short-term interest rate, as it increases, investors become more interested in investing in an enterprise of this particular country. Of all the indicators, short-term interest rate is statistically significant at a level of 1 % and the number of tourists is at a level of 5%. Results on non-economic indicators in Germany are repeating the previously obtained results for France in the context of a positive and negative impact on the dependent variable. Thus, terrorist attack in New York in 2001, plane crash in 2002, the Global stock market collapse that occurred in October 2008 and the Brexit referendum in June 2016 and including Olympic games in Russia in June 2018, all of these events are for the indicator hotel stocks return negative effect. And the events of the London G20 summit, which took place in April 2009, the Egypt military coup in July 2013, the Terrorist attribution in Paris in 2015 and labor reform in France have a positive effect on our dependent variable. Although the composition of statistically significant variables has changed. In addition to the Global stock market collapse and the London G20 summit also added the Brexit and The Brexit, the Global stock market collision and terrorist attack are statistically significant at 5% level, and the London G20 summit is significant at 1% level.

Table 5. OLS Spain

Dependent variable: HR\_S

	<b>Coefficient</b>	<b>Std, Error</b>	<b>t-ratio</b>	<b>p-value</b>	
const	-0,089897	0,548265	-0,1640	0,8699	
UNMP_S	-11,6826	2,57107	-4,544	<0,0001	***
SIR_S	-0,835840	4,24209	-0,1970	0,844	
EXR_S	0,361235	0,234992	1,537	0,1257	
TA_S	0,022502	0,0235513	0,9554	0,3404	
EMC	14,3447	8,10268	1,77	0,0781	*
GSMC	-28,2879	8,62609	-3,279	0,0012	***
LG20	59,8265	8,16196	7,33	<0,0001	***
PTA	6,34738	8,11269	0,7824	0,4348	
BRX	-16,5156	8,1054	-2,038	0,0428	**
OGR	-2,21330	8,10924	-0,2729	0,7852	

TA1109	-28,1661	8,25717	-3,411	0,0008	***
PC2002	-21,4109	8,18667	-2,615	0,0095	***
LRF	-0,665253	8,1317	-0,08181	0,9349	
<hr/>					
Mean dependent var	-0,204822		S,D, dependent var	9,985345	
Sum squared resid	13930,22		S,E, of regression	8,068114	
R-squared	0,384531		Adjusted R-squared	0,347143	
F(13, 214)	10,28481		P-value(F)	9,38e-17	
Log-likelihood	-792,3396		Akaike criterion	1612,679	
Schwarz criterion	1660,690		Hannan-Quinn	1632,050	
rho	0,110135		Durbin-Watson	1,773936	

Source: own elaboration from GRET

An analysis of Spain's data presents completely different results. Macroeconomic indicators, such as unemployment rate and short-term interest rate, have a negative effect on hotel stock returns, while other macroeconomic indicators such as exchange rate, and the number of tourists arrivals have a positive effect. That unemployment is a significant indicator of hospitality returns was stated by Chen et al. (2012). Their empirical findings indicate that changes in unemployment caused a drop in stock returns of approximately 12 and 9 percentage points in Taiwan and Japan, respectively, which are similar to Spain's 12 percentage point outcomes. Changes in the unemployment rate are therefore an influential factor that can adversely affect the returns on hotel stock. The increase of the unemployment rate is the symptom of the economic downturn in a country which results into negative hotel stock returns (Chen et al., 2005). And here unemployment rate is statistically significant at 1% level, while all the others macroeconomic variables are not significant at 10%, 5% or 1% level. In the case of non-economic variables, the Global stock market collapse, the Brexit referendum, terrorist attack, plane crash, labor reform in France and Olympic games in Russia, all of these events are for the indicator hotel stocks return negative effect. And the events of the London G20 summit, the Egypt military coup and the Terrorist attribution in Paris have a positive effect on our dependent variable. The terrorist attack in 2001, the plane crash in 2002, Global stock market collapse and the London G20 summit as variables are statistically significant at 1% level. the Brexit referendum is significant at 5 % level. While the Egypt military coup is significant at 10 % level. Since for Spain tourism is one of the main sectors of activity, the importance of events not only affecting the financial

component, but also the political situation in Egypt, a country which is also a major supplier of tourist services, as well as terrorist attack and plane crash. Such phenomena dramatically affect people's behavior and their desire to travel.

Next, we calculate the sample correlation between the OLS residuals for all three models, which is represented in Table 6. The observed correlations are rather high, which means that residuals for both models are influenced by the same unobserved or unconsidered factors.

Table 6. Correlation of OLS residuals

OLS France	OLS Germany	OLS Spain	
1.0000	0.5600	0.4729	OLS France
	1.0000	0.4995	OLS Germany
		1.0000	OLS Spain

Source: own elaboration from GRET

Therefore, we allow for the disturbances to be contemporaneously correlated and estimate the SUR model. As mentioned before, allowing for contemporaneous correlated errors between countries results into information gains which in turn increases the efficiency of the estimated model parameters. Estimation results are presented in Table 7-9.

Table 7. Equation 1: SUR, Dependent variable: HR\_F

	coefficient	std. error	t-ratio	p-value	
const	0,437198	0,491341	0,8898	0,3746	
UNMP_F	3,21392	3,79596	0,8467	0,3981	
SIR_F	2,50942	3,50193	0,7166	0,4744	
EXR_F	0,277298	0,209556	1,323	0,1872	
TA_F	-0,00279661	0,0102184	-0,2737	0,7846	
EMC	5,11018	7,23910	0,7059	0,4810	
GSMC	-20,5745	7,48720	-2,748	0,0065	***
LG20	19,9844	7,28411	2,744	0,0066	***
PTA	7,41594	7,23374	1,025	0,3064	
BRX	-12,0298	7,22301	-1,665	0,0973	*
OGR	-11,0498	7,22701	-1,529	0,1278	
TA1109	-32,3117	7,33976	-4,402	1,69E-05	***
PC2002	-20,4000	7,27082	-2,806	0,0055	***
LRF	1,28484	7,23166	0,1777	0,8592	
Mean dependent var	0,113776	S,D, dependent var	8,042053		
Sum squared resid	11847,75	S,E, of regression	7,208594		
R-squared	0,193007	Adjusted R-squared	0,143984		

Source: own elaboration from GRET

Table 8. Equation 2: SUR, Dependent variable: HR\_D

	coefficient	std. error	t-ratio	p-value	
const	-0,283362	0,719432	-0,3939	0,6941	
UNMP_D	-0,492293	5,43215	-0,09063	0,9279	
SIR_D	12,4753	4,94749	2,522	0,0124	**
EXR_D	-0,197233	0,301134	-0,6550	0,5132	
TA_D	-0,0884156	0,0370382	-2,387	0,0178	**
EMC	6,12147	10,4396	0,5864	0,5582	
GSMC	-23,7135	10,6202	-2,233	0,0266	**
LG20	73,0549	10,4927	6,962	4,04E-11	***
PTA	2,78840	10,3843	0,2685	0,7886	
BRX	-26,7190	10,3831	-2,573	0,0107	**
OGR	-5,33282	10,3922	-0,5132	0,6084	
TA1109	-26,7451	10,5366	-2,538	0,0119	**
PC2002	-11,0088	10,5014	-1,048	0,2957	
LRF	8,65332	10,3921	0,8327	0,4060	
Mean dependent var	-0,546421	S,D, dependent var	12,0097		
Sum squared resid	24525,32	S,E, of regression	10,37146		
R-squared	0,250926	Adjusted R-squared	0,205422		

Table 9. Equation 3: SUR, Dependent variable: HR\_S

	coefficient	std. error	t-ratio	p-value	
const	-0,0619856	0,531074	-0,1167	0,9072	
UNMP_S	-7,81411	2,08311	-3,751	0,0002	***
SIR_S	2,28565	3,96719	0,5761	0,5651	
EXR_S	0,383268	0,227536	1,684	0,0936	*
TA_S	0,0158898	0,0206077	0,7711	0,4415	
EMC	14,0174	7,84710	1,786	0,0755	*
GSMC	-32,0849	8,25434	-3,887	0,0001	***
LG20	59,4548	7,89945	7,526	1,43E-12	***
PTA	7,04396	7,85309	0,8970	0,3707	
BRX	-15,7000	7,84755	-2,001	0,0467	**
OGR	-1,41699	7,85155	-0,1805	0,8570	
TA1109	-26,7883	7,98284	-3,356	0,0009	***
PC2002	-22,3907	7,91947	-2,827	0,0051	***
LRF	0,304562	7,86818	0,03871	0,9692	
Mean dependent var	-0,204822	S,D, dependent var	9,985345		
Sum squared resid	14083,23	S,E, of regression	7,859297		
R-squared	0,378310	Adjusted R-squared	0,340544		

Source: own elaboration from GRET

The parameter interpretation results did change from the OLS results. For France the LG20 significance change from level of 5% to level of 1%. Also, the Brexit became

significantly important at level of 10%. For Germany variable of short interest rate became significant at 5% level compared to 1% in OLS results. For Spain exchange rate became significant at 10% level.

Impirical finding from SUR analysis says that terrorist attack in New York had massive effect on hotel stock returns. For Spain and Germany decrease was almost 27 percent points. for France drop was even bigger and reached 32,3 percent points. Global stock market collision also had dramatic consequences for all countries and their hotel stock returns. For France decrease was 20,6 percent points, for Germany 23,7 and for Spain 32 percent points. While G20 summit in London brought positive changes. France hotel stock returns increased by almost 20 percent points. In case of Germany increase was 73 percent points. And in Spain's hotel industry this summit caused increase equal to 59,5 percent points.

Also we can compare the strength of the effect between different countries. For example, we wish to test if the effect of the Global stock market collapse is the same for all countries:

$$H_0: \beta_{GSMC, France} = \beta_{GSMC, Spain} \quad aka \beta_1 = \beta_2 \quad (8)$$

$$H_1: \beta_1 \neq \beta_2$$

Then the test statistic is given by:

$$t = \frac{\beta_1 - \beta_2}{\sqrt{Var(\beta_1) + Var(\beta_2) - 2 * Cov(\beta_1, \beta_2)}} \quad (9)$$

In MLR this covariance is assumed to be zero but in SUR it is estimated. So, we can use SUR estimation results to test for equality of the coefficients. This comparison can be used to extend this work in a future.

Indeed, the limitations of this paper deserve to be noted. The limited number of hotels that are publicly listed on stock market. In addition, this work analyzes only 3 developed countries and the results cannot be applied without thinking to other countries, because of their different economic conditions, differently developed tourism sector and other multiple external factors. Therefore, there are many possible extensions for future research lines.

## 5. CONCLUSION

In this document, using stock market data and macroeconomic and non-economic factors, the nature of the hospitality industry is evaluated. As explanatory variables, four macroeconomic factors and seven non-economic variables are used to explore the determinants of the yields of hotel stocks in France, Germany and Spain. According to the result of the analysis, we can draw several conclusions.

First, non-economic events such as natural disasters, political unrest, economic crises, mass events, such as the Olympic Games, have an impact on hotel stock returns. Events such as the economic crisis in 2008 and the G20 summit in 2009, held to resolve issues of economic recovery, have established a large imprint on the dependent variable, which was responsible for data on hotel stock returns in France, Germany and Spain.

Secondly, we noticed that these non-economic events have a greater impact on the dependent indicator than macroeconomic indicators. This outcome is consistent with Chiang and Kee's (2009) finding that Singapore's stock returns of the hospitality industry are more susceptible to non-macroeconomic variables than to macroeconomic variables.

Thirdly, countries such as Germany and France, where, despite the importance and prospects of development, tourism still has a smaller share of the contribution to the economy than in Spain. This is reflected in the share of tourism GDP in each country. In Germany, the percentage is 8,7 to total GDP, for France the number is 9,4 %, while for Spain share of tourism is equal to 11,7% of total GDP. Germany and France are less dependent on non-economic variables that have no influence on the state of the economy as a whole. Hotel stock returns of these countries were subjected to a statistically significant impact from events such as the economic crisis and the elimination of its consequences, rather than from the event of political instability in Egypt, a country that is a major supplier of travel services. On the other hand, according to Spain, it is clear that this country, as one of the most popular tourist destinations, and its hospitality industry in particular, have been strongly influenced by events that are not related to the economy as a whole, but are more closely related to tourism, for example, the closure of the entrance to a politically unstable Egypt, which contributed to the growth of tourists. Or plane crash tragedy, that took many lives and settled the fear of flying in people. Thus, we can summarize that the hotel stock returns in France, Germany and Spain depend less on macroeconomic and more on non-economic events. As well as the degree of influence depends on the specialization of the country, i.e. if a country is more about tourism, it is

more influenced by variables than by countries for which tourism is a secondary occupation.

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